

**UTILITY PATENT
APPLICATION TRANSMITTAL**

(Only for new nonprovisional applications
under 37 CFR 1.53(b))

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Attorney Docket No.

981331

Total Pages

135

First Named Inventor or Application Identifier

Masuo OHNISHI, Toyokazu HAMAGUCHI
and Hiroshi MUTOH

Express Mail Label No.

APPLICATION ELEMENTS FOR:

ELECTRONIC APPARATUS AND DISK UNIT
MOUNTING MECHANISM

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2. ☒ Specification Total Pages [42]
3. ☒ Drawing(s) (35 USC 113) Total Sheets [10]
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 - b. ☐ Copy from prior application (37 CFR 1.63(d))
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 - i. ☐ Deletion of Inventor(s)
Signed statement attached deleting inventor(s) named in prior application,
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The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
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ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet and document(s))
9. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney

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PAGE 2 OF 3

10. ☐ English translation Document (if applicable)

11. ☒ Information Disclosure Statement ☒ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Return Receipt Postcard (MPEP 503)

14. ☐ Small Entity Statement(s) ☐ Statement filed in prior application
Status still proper and desired.

15. ☐ Claim for Convention Priority ☐ Certified copy of Priority Document(s)

- a. Priority of _____ application no. _____ filed on _____ is claimed under 35 USC 119.
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16. ☐ Other _____

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| FEE TRANSMITTAL | Number Filed | Number Extra | Rate | Basic Fee |
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| The filing fee is calculated below | | | | \$790.00 |
| Total Claims | 47 - 20 | 27 | x \$22.00 | \$594.00 |
| Independent Claims | 12 - 3 | 9 | x \$82.00 | \$738.00 |
| Multiple Dependent Claims | | | \$270.00 | \$270.00 |
| Basic Filing Fee | | | | \$2392.00 |
| Reduction by 1/2 for small entity | | | | |
| Fee for recording enclosed Assignment | | | \$40.00 | \$40.00 |
| TOTAL | | | | \$2432.00 |

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Date: November 3, 1998

WFW/tmb

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, Masuo Ohnishi, a citizen of Japan residing at Kawasaki-shi, Kanagawa, Japan, Toyokazu Hamaguchi, a citizen of Japan residing at Kawasaki-shi, Kanagawa, Japan and Hiroshi Mutoh, a citizen of Japan residing at Kawasaki-shi, Kanagawa, Japan have invented certain new and useful improvements in

ELECTRONIC APPARATUS AND DISK UNIT
MOUNTING MECHANISM

of which the following is a specification : -

1 TITLE OF THE INVENTION

ELECTRONIC APPARATUS AND DISK UNIT MOUNTING
MECHANISM

5 BACKGROUND OF THE INVENTION

The present invention generally relates to electronic apparatuses and disk unit mounting mechanisms, and more particularly to an electronic apparatus and a disk unit mounting mechanism characterized by a shock-resistant mounting structure of a disk unit such as a hard disk drive (HDD) in a portable electronic apparatus such as a notebook type personal computer.

In this specification, the disk unit refers to a magnetic disk unit, an optical disk unit, a magneto-optic disk unit, a hard disk drive, a floppy disk drive (FDD), a CD-ROM drive and the like which record and/or reproduce information on and/or reproduce information from a disk-shaped recording medium.

Recently, the performance of the notebook type personal computer has improved, and it is becoming popular to mount in the notebook type personal computer a hard disk drive which has a large storage capacity and a high operation speed compared to a floppy disk drive.

A description will be given of a hard disk drive mounting structure of a conventional notebook type personal computer, by referring to FIG.1.

FIG.1 is a disassembled perspective view of a notebook type personal computer 50 mounted with a hard disk drive. In FIG.1, a hard disk drive (HDD) 52 is mounted in a HDD accommodating part provided on a back side of a front right of a housing 51 of the notebook type personal computer 50.

In this case, The HDD 52 accommodates a disk-shaped storage media, a head, a motor and the

1 like. The HDD 52 is fixed on a HDD mounting metal
fitting 53 by a screw 54 so that a printed circuit
side of the HDD 52 faces a HDD cover 57. The metal
fitting 53 is fixed on the housing 51 by a screw 55.

5 In addition, a flexible printed circuit
(FPC) cable 56 mounted on the housing 51 is arranged
so as to electrically connect to the printed circuit
of the HDD 52. Thereafter, the HDD cover 57 is slid
to cover the HDD accommodating part of the housing 51,
10 and the HDD cover 57 is fixed to the housing 51 by
screws 58. No shock absorbing material or the like is
used.

In the case of a magnetic disk drive mounted
in a lap-top computer or the like, it is proposed in a
15 Japanese Laid-Open Patent Application No.3-241583, for
example, to provide a plurality of vibration-
preventing rubber pieces between a housing and a side
surface of the magnetic disk drive, so as to prevent a
positioning error from being generated due to
20 vibration of a magnetic head. It is also proposed to
use a combination of a plurality of vibration-
preventing rubber pieces having damping
characteristics with different temperature
dependencies, so as to cope with a wide range of
25 temperature changes. In addition, it is also proposed
to use Sorbothane (trademark) which is made of an
ether system polyurethane as the vibration-preventing
rubber.

In addition, in the case of a fixed magnetic
30 disk drive used in a large scale computer, it is
proposed in a Japanese Laid-Open Utility Model
Application no.59-135504, for example to make the
magnetic disk drive portable by accommodating the
magnetic disk drive in an external box. It is vaguely
35 proposed to provide a plurality of shock absorbers
such as shock absorbing rubber pieces between the
external box and inner top, bottom and side surfaces

1 of a main body of the magnetic disk drive, so as to
greatly relax restricting conditions with respect to
the vibration and shock.

However, in the notebook type personal
5 computer mounted with the HDD described above, the HDD
itself is becoming smaller and lighter due to the
increased recording density of the HDD. Particularly
when the HDD is light, there are increased
opportunities for the HDD to be carried. On the other
10 hand, the mechanical strength of the HDD deteriorates
as the HDD becomes smaller. As a result, a shock
applied on the HDD while the HDD is carried or during
operation of the HDD may generate a fault.

For example, because the conventional HDD is
15 fixed to the housing of the notebook type personal
computer by screws, the magnetic head makes contact
with the disk-shaped storage media when a shock is
applied on the HDD which is carried or during
operation of the HDD. The disk-shaped media is
20 damaged when the magnetic head makes contact with the
disk-shaped storage media, and this damage causes data
destruction thereby generating a fault.

On the other hand, if a floating structure
is used for the HDD, it becomes impossible to
25 accurately set a head position due to residual
vibration accompanying the rotation of the disk-shaped
storage media when making a seek operation to make the
magnetic head seek a recording region during
operation. In this case, a read error is generated.

30 Further, in the case of the lap-top computer
or the like, the vibration preventing rubber is
provided on the side surface of the magnetic disk
drive in order to make the magnetic disk drive
vibration proof. However, no special considerations
35 are made with respect to the shock, particularly the
shock applied on the magnetic disk drive when the
computer is carried. For this reason, the vibration

1 preventing rubber does not provide a solution to the
problems introduced when the magnetic disk drive is
carried.

Moreover, the portable fixed magnetic disk
5 drive described above is not intended for the general
user, and the fixed magnetic disk drive is
considerably large compared to the HDD mounted in the
notebook type personal computer. For this reason,
there are no strict demands to reduce the size and
10 weight of the fixed magnetic disk drive, and various
kinds of measures may be taken against the vibration
and shock applied on the fixed magnetic disk drive.
However, such measures which may be taken in the fixed
magnetic disk drive do not suggest particular measures
15 which may be taken with respect to the notebook type
personal computer which is used by the general user
and in which restricting conditions exist to reduce
the size and weight of the HDD.

20 SUMMARY OF THE INVENTION

Accordingly, it is a general object of the
present invention to provide a novel and useful
electronic apparatus and a disk unit mounting
mechanism, in which the problems described above are
25 eliminated.

Another and more specific object of the
present invention is to eliminate the problem of data
destruction caused by the shock applied on the disk
unit such as the HDD, and to provide a disk unit
30 mounting structure having an improved reliability.

Still another object of the present
invention is to provide an electronic apparatus
mounted with a hard disk drive, wherein vibration
and/or shock absorbing members which absorb vibration
35 and/or shock are provided between the hard disk drive
and a lid member which covers a hard disk drive
accommodating part provided in a housing of the

1 electronic apparatus. According to the present
invention, it is possible to improve the vibration
resistance and the shock resistance because the hard
disk drive is protected by small pieces of the
5 vibration and/or shock absorbing members. As a
result, it is possible to prevent data destruction
from being generated in the hard disk drive due to the
shock and to prevent a read error from being generated
in the hard disk drive due to the vibration.
10 Accordingly, the reliability of the portable
electronic apparatus such as the notebook type
personal computer is greatly improved.

A further object of the present invention is
to provide an electronic apparatus mounted with a hard
15 disk drive, comprising vibration and/or shock
absorbing members which are formed by a plurality of
small pieces and absorb vibration and/or shock are
provided between the hard disk drive and a hard disk
drive accommodating part provided in a housing of the
20 electronic apparatus, and a sheet member is provided
between the hard disk drive and the plurality of small
pieces forming the vibration and/or shock absorbing
members. According to the present invention, it is
possible to improve the vibration resistance and the
25 shock resistance because the hard disk drive is
protected by small pieces of the vibration and/or
shock absorbing members. As a result, it is possible
to prevent data destruction from being generated in
the hard disk drive due to the shock and to prevent a
30 read error from being generated in the hard disk drive
due to the vibration. Accordingly, the reliability of
the portable electronic apparatus such as the notebook
type personal computer is greatly improved. Further,
it is possible to prevent direct contact with the
35 vibration and/or shock absorbing members and the hard
disk drive, so that the vibration and/or shock
absorbing members will not be deformed at the time of

1 the assembling process and moisture absorbed by the
vibration and/or shock absorbing members will not
cause an electrical short-circuit even if the
vibration and/or shock absorbing members are provided
5 on a side of the hard disk drive having exposed
wirings and/or electrical circuits.

Another object of the present invention is
to provide an electronic apparatus mounted with a hard
disk drive, wherein vibration and/or shock absorbing
10 members are provided between the hard disk drive and
an inner bottom surface and inner side surfaces of a
hard disk drive accommodating part provided in a
housing of the electronic apparatus, and the vibration
and/or shock absorbing members provided between the
15 hard disk drive and the inner bottom surface and the
vibration and/or shock absorbing members provided
between the hard disk drive and the inner surface are
made of mutually different materials. According to
the present invention, it is possible to improve the
20 vibration resistance and the shock resistance because
the hard disk drive is protected by small pieces of
the vibration and/or shock absorbing members. As a
result, it is possible to prevent data destruction
from being generated in the hard disk drive due to the
25 shock and to prevent a read error from being generated
in the hard disk drive due to the vibration.
Accordingly, the reliability of the portable
electronic apparatus such as the notebook type
personal computer is greatly improved.

30 Another object of the present invention is
to provide an electronic apparatus mounted with a hard
disk drive, wherein a plurality of vibration and/or
shock absorbing members made of different materials
and having different thicknesses are provided with
35 respect to at least one of confronting surfaces of the
hard disk drive and a hard disk drive accommodating
part provided in a housing of the electronic

1 apparatus. According to the present invention, it is
possible to improve the vibration resistance and the
shock resistance because the hard disk drive is
protected by small pieces of the vibration and/or
5 shock absorbing members. As a result, it is possible
to prevent data destruction from being generated in
the hard disk drive due to the shock and to prevent a
read error from being generated in the hard disk drive
due to the vibration. Accordingly, the reliability of
10 the portable electronic apparatus such as the notebook
type personal computer is greatly improved.

Still another object of the present
invention is to provide a disk unit mounting mechanism
mountable with a disk unit characterized by a disk
15 unit accommodating part accommodating the disk unit
which is mounted, a lid member covering the disk unit
accommodating part, and a vibration and/or shock
absorbing member which absorbs vibration and/or shock
and is arranged between the lid member and the disk
20 unit which is mounted. By providing the vibration
and/or shock absorbing members between the disk unit
which is mounted and the lid member which covers the
disk unit accommodating part provided in the housing,
it is possible to improve the shock-resistance of the
25 disk unit. Hence, it is possible to prevent data
destruction from being generated in the disk unit,
such as the HDD, due to the shock when the disk unit
is dropped or is placed on a desk.

A further object of the present invention is
30 to provide a disk unit mounting mechanism mountable
with a disk unit characterized by a disk unit
accommodating part accommodating the disk unit which
is mounted, a lid member covering the disk unit
accommodating part, and a vibration and/or shock
35 absorbing member, formed by a plurality of small
pieces and absorbs vibration and/or shock, arranged
between the lid member and the disk unit which is

1 mounted, and a sheet member arranged between the
plurality of small pieces forming the vibration and/or
shock absorbing member and the disk unit which is
mounted. By mounting the vibration and/or shock
5 absorbing members on the sheet material, it is
possible to prevent the deformation of the vibration
and/or shock absorbing members. As a result, the
shock resistance of the disk unit is improved, and in
addition, it is possible to prevent the electrical
10 short-circuit even when the dew drop is formed on the
vibration and/or shock absorbing members.

Another object of the present invention is
to provide a disk unit mounting mechanism mountable
with a disk unit characterized by a disk unit
15 accommodating part accommodating the disk unit which
is mounted, and vibration and/or shock absorbing
members arranged between an inner bottom surface and
an inner side surface of the disk unit accommodating
part and the disk unit which is mounted, wherein the
20 vibration and/or shock absorbing member 3 arranged
between the disk unit which is mounted and the inner
bottom surface and the vibration and/or shock
absorbing member arranged between the disk unit which
is mounted and the inner side surface are made of
25 mutually different materials. By providing the
vibration and/or shock absorbing members between the
disk unit and the inner surface of the disk unit
accommodating part provided in the housing, it is
possible to improve the vibration resistance of the
30 disk unit, thereby preventing a read error from being
generated. Further, in this case, the vibration
resistance is required of the vibration and/or shock
absorbing members provided between the disk unit and
the inner surface of the disk unit accommodating part
35 provided in the housing, while the shock resistance is
required of the vibration and/or shock absorbing
members 3 provided between the disk unit and the inner

1 bottom surface of the disk unit accommodating part.
Hence, it is desirable that the vibration and/or shock
absorbing members are made of mutually different
materials.

5 Still another object of the present
invention is to provide a disk unit mounting mechanism
mountable with a disk unit characterized by a disk
unit accommodating part accommodating the disk unit
which is mounted, and vibration and/or shock absorbing
10 members arranged between an inner bottom surface and
an inner side surface of the disk unit accommodating
part and the disk unit which is mounted, wherein the
vibration and/or shock absorbing members arranged
between the disk unit and the inner bottom surface and
15 the vibration and/or shock absorbing member arranged
between the disk unit and the inner side surface are
made of materials having mutually different vibration
and/or shock absorbing characteristics. By providing
vibration and/or shock absorbing members having
20 different vibration and/or shock absorbing
characteristics, it is possible to effectively cope
with shocks ranging from weak to strong shocks, and
the vibration resistance and the shock resistance of
the disk unit are improved.

25 A further object of the present invention is
to provide a disk unit mounting mechanism mountable
with a disk unit characterized by a disk unit
accommodating part accommodating the disk unit which
is mounted, and a plurality of vibration and/or shock
30 absorbing members having different thicknesses
arranged with respect to at least one of confronting
surfaces of the disk unit which is mounted and the
disk unit accommodating part. By providing the
vibration and/or shock absorbing members having the
35 different thicknesses with respect to at least one
surface of the disk unit, particularly with respect to
a lid member, it is possible to use a thin material

1 and a thick material, for example, so that the shock
resistance is improved with respect to various kinds
of shocks ranging from weak to strong shocks.

Another object of the present invention is
5 to provide a disk unit mounting mechanism mountable
with a disk unit characterized by a disk unit
accommodating part accommodating the disk unit which
is mounted, and a plurality of vibration and/or shock
absorbing members having different vibration and/or
10 shock absorbing characteristics arranged with respect
to at least one of confronting surfaces of the disk
unit which is mounted and the disk unit accommodating
part. By providing the vibration and/or shock
absorbing members with respect to at least one surface
15 of the disk unit, particularly, with respect to the
side of a lid member, and forming the vibration and/or
shock absorbing members from materials having
different vibration and/or shock absorbing
characteristics, it is possible to realize a shock
20 resistance which can cope with a wide range of shocks
ranging from weak to strong shocks.

Other objects and further features of the
present invention will be apparent from the following
detailed description when read in conjunction with the
25 accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a disassembled perspective view
showing an important part of a conventional notebook
30 type personal computer;

FIG.2 is a diagram for explaining the
operating principle of the present invention;

FIGS.3A and 3B respectively are perspective
views showing a display panel part and a housing top
35 cover of a first embodiment of an electronic apparatus
according to the present invention;

FIG.4 is a bottom view showing the housing

1 top cover of the first embodiment of the electronic apparatus;

FIG.5 is a disassembled perspective view showing a housing base of the first embodiment of the electronic apparatus;

FIG.6 is a perspective view showing a mounting structure of vibration and/or shock absorbing members on the housing base of the first embodiment of the electronic apparatus;

10 FIGS.7A through 7C respectively are diagrams showing an important part of a second embodiment of the electronic apparatus;

FIGS.8A through 8C respectively are diagrams showing an important part of a first modification of the second embodiment of the electronic apparatus;

FIG.9 is a perspective view showing an important part of a second modification of the second embodiment of the electronic apparatus; and

FIG.10 is a perspective view showing a third embodiment of the electronic apparatus according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG.2 is a diagram for explaining the operating principle of the present invention. A description will be given of means for solving the problems in the present invention, by referring to FIG.2.

FIG.2 is a disassembled perspective view generally showing a HDD (hard disk drive) mounting structure, and the illustration of a housing is omitted. Although the following description takes the HDD as an example of the disk unit, the application of the present invention is of course not limited to the HDD, and the present invention is similarly applicable to various kinds of disk units such as a FDD (floppy disk drive).

1 (1) An electronic apparatus mounted with a
disk unit 1 in the present invention is characterized
in that vibration and/or shock absorbing members 3
which absorb vibration and/or shock are provided
5 between the disk unit 1 and a lid member 2 which
covers a disk unit accommodating part provided in a
housing of the electronic apparatus.

By providing the vibration and/or shock
absorbing members 3 between the disk unit 1 and the
10 lid member 2 which covers the disk unit accommodating
part provided in the housing, it is possible to
improve the shock-resistance of the electronic
apparatus. Hence, it is possible to prevent data
destruction from being generated in the disk unit 1,
15 such as the HDD, due to the shock when the electronic
apparatus is dropped or is placed on a desk.

(2) The present invention is characterized
in that, in (1) above, the vibration and/or shock
absorbing members 3 provided between the lid member 2
20 and the disk unit 1 are formed by a plurality of small
pieces.

A single large vibration and/or shock
absorbing member may be provided on the entire surface
as the vibration and/or shock absorbing member 3. But
25 by forming the vibration and/or shock absorbing
members 3 from the plurality of small pieces, it is
possible to further improve the vibration resistance
and the shock resistance.

(3) The present invention is characterized
30 in that, in (2) above, a sheet member 6 is provided
between the disk unit 1 and the plurality of small
pieces forming the vibration and/or shock absorbing
members 3.

In general, the vibration and/or shock
35 absorbing members 3 are made of a porous material
having a large coefficient of friction. For this
reason, if the lid member 2 were mounted by sliding

1 the lid member 2, the vibration and/or shock absorbing
members 3 would be deformed in a horizontal direction
due to the friction and the vibration and/or shock
absorbing effect would be reduced. But by mounting
5 the vibration and/or shock absorbing members 3 on the
sheet material 6, it is possible to prevent the
deformation of the vibration and/or shock absorbing
members 3.

In addition, when dew drop is formed on the
10 vibration and/or shock absorbing members 3 which are
provided between the lid member 2 and the disk unit 1,
the moist vibration and/or shock absorbing members 3
will make contact with the printed circuit of the disk
unit 1 because the vibration and/or shock absorbing
15 member 3s uneasily dry, thereby causing an electrical
short-circuit. But by interposing the sheet member 6
between the disk unit 1 and the vibration and/or shock
absorbing members 3, it is possible to prevent the
electrical short-circuit even when the dew drop is
20 formed on the vibration and/or shock absorbing members
3.

(4) An electronic apparatus mounted with a
disk unit 1 in the present invention is characterized
in that vibration and/or shock absorbing members 3
25 which are formed by a plurality of small pieces and
absorb vibration and/or shock are provided between the
disk unit 1 and a lid member 2 which covers a disk
unit accommodating part provided in a housing of the
electronic apparatus, and a sheet member 6 is provided
30 between the disk unit 1 and the plurality of small
pieces forming the vibration and/or shock absorbing
members 3.

As described above under (3) above, by
mounting the vibration and/or shock absorbing members
35 3 on the sheet material 6, it is possible to prevent
the deformation of the vibration and/or shock
absorbing members 3. As a result, the shock

1 resistance of the electronic apparatus is improved,
and in addition, it is possible to prevent the
electrical short-circuit even when the dew drop is
formed on the vibration and/or shock absorbing members
5 3.

(5) An electronic apparatus mounted with a
disk unit 1 in the present invention is characterized
in that vibration and/or shock absorbing members 3 and
4 are provided between the disk unit 1 and an inner
10 bottom surface and inner side surfaces of a disk unit
accommodating part provided in a housing of the
electronic apparatus, and the vibration and/or shock
absorbing members 3 provided between the disk unit 1
and the inner bottom surface and the vibration and/or
15 shock absorbing members 4 provided between the disk
unit 1 and the inner surface are made of mutually
different materials.

By providing the vibration and/or shock
absorbing members 4 between the disk unit 1 and the
20 inner surface of the disk unit accommodating part
provided in the housing, it is possible to improve the
vibration resistance of the disk unit 1, thereby
preventing a read error from being generated.

Further, in this case, the vibration
25 resistance is required of the vibration and/or shock
absorbing members 4 provided between the disk unit 1
and the inner surface of the disk unit accommodating
part provided in the housing, while the shock
resistance is required of the vibration and/or shock
30 absorbing members 3 provided between the disk unit 1
and the inner bottom surface of the disk unit
accommodating part. Hence, it is desirable that the
vibration and/or shock absorbing members 3 and 4 are
made of mutually different materials.

35 (6) An electronic apparatus mounted with a
disk unit 1 in the present invention is characterized
in that vibration and/or shock absorbing members 3, 4

1 and 5 are provided between the disk unit 1 and an
inner bottom surface and an inner side surface of a
disk unit accommodating part provided in a housing of
the electronic apparatus, and the vibration and/or
5 shock absorbing members 3 and 5 provided between the
disk unit 1 and the inner bottom surface and the
vibration and/or shock absorbing member 4 provided
between the disk unit 1 and the inner side surface are
made of materials having mutually different vibration
10 and/or shock absorbing characteristics.

By providing vibration and/or shock
absorbing members having different vibration and/or
shock absorbing characteristics, it is possible to
effectively cope with shocks ranging from weak to
15 strong shocks, and the vibration resistance and the
shock resistance of the electronic apparatus are
improved.

(7) The present invention is characterized
in that, in (5) or (6) above, the vibration and/or
20 shock absorbing member 4 provided between the disk
unit 1 and the inner side surface is made of a
material having a higher vibration resistance than a
material forming the vibration and/or shock absorbing
members 3 and 5 provided between the disk unit 1 and
25 the inner bottom surface.

In this case, it is possible to flexibly
cope with the vibration resistance and the shock
resistance required by the electronic apparatus.

(8). The present invention is characterized
30 in that, in (5) or (6) above, the vibration and/or
shock absorbing member 4 provided between the disk
unit 1 and the inner side surface is made of a
material which is harder than a material forming the
vibration and/or shock absorbing members 3 and 5
35 provided between the disk unit 1 and the inner bottom
surface.

In this case, it is possible to flexibly

1 cope with the vibration resistance and the shock
resistance required by the electronic apparatus.

(9) The present invention is characterized
in that, in any of (5) to (8) above, the vibration
5 and/or shock absorbing members 4 provided between the
disk unit 1 and the inner surface of the disk unit
accommodating part provided in the housing are formed
by a plurality of small pieces.

A single large vibration and/or shock
10 absorbing member may be provided on the entire surface
as the vibration and/or shock absorbing member 4 which
is provided between the disk unit 1 and the inner
surface of the disk unit accommodating part provided
in the housing. But by forming the vibration and/or
15 shock absorbing members 4 from the plurality of small
pieces, it is possible to further improve the
vibration resistance.

(10) An electronic apparatus mounted with a
disk unit 1 in the present invention is characterized
20 in that a plurality of vibration and/or shock
absorbing members 3, 4 and 5 having different
thicknesses are provided with respect to at least one
of confronting surfaces of the disk unit 1 and a disk
unit accommodating part provided in a housing of the
25 electronic apparatus.

By providing the vibration and/or shock
absorbing members 3, 4 and 5 having the different
thicknesses with respect to at least one surface of
the disk unit 1, particularly with respect to a lid
30 member 2, it is possible to use a thin material and a
thick material, for example, so that the shock
resistance is improved with respect to various kinds
of shocks ranging from weak to strong shocks.

(11) The present invention is characterized
35 in that, in (10) above, the plurality of vibration
and/or shock absorbing members 3, 4 and 5 are made of
the same material.

1 In this case, it is possible to flexibly
cope with the vibration resistance and the shock
resistance required by the electronic apparatus.

(12) An electronic apparatus mounted with a
5 disk unit 1 in the present invention is characterized
in that a plurality of vibration and/or shock
absorbing members 3, 4 and 5 having different
vibration and/or shock absorbing characteristics are
provided with respect to at least one of confronting
10 surfaces of the disk unit 1 and a disk unit
accommodating part provided in a housing of the
electronic apparatus.

By providing the vibration and/or shock
absorbing members 3, 4 and 5 with respect to at least
15 one surface of the disk unit 1, particularly, with
respect to the side of a lid member 2, and forming the
vibration and/or shock absorbing members 3, 4 and 5
from materials having different vibration and/or shock
absorbing characteristics, it is possible to realize a
20 shock resistance which can cope with a wide range of
shocks ranging from weak to strong shocks.

(13) The present invention is characterized
in that in (10) or (12) above, the plurality of
vibration and/or shock absorbing members 3, 4 and 5
25 are made of materials having different hardnesses.

In this case, it is possible to flexibly
cope with the vibration resistance and the shock
resistance required by the electronic apparatus.

(14) The present invention is characterized
30 in that, in any of (1) to (13) above, the vibration
and/or shock absorbing members 5 are also provided
between the disk unit 1 and an inner top surface of
the disk unit accommodating part provided in the
housing.

35 By providing the vibration and/or shock
absorbing members 5 between the disk unit 1 and the
inner top surface of the disk unit accommodating part

1 provided in the housing, it is possible to further
improve the vibration resistance and the shock
resistance, and particularly the shock resistance.

(15) The present invention is characterized
5 in that, in any of (1) to (14) above, the vibration
and/or shock absorbing members 3, 4 and 5 are adhered
on a member confronting the disk unit 1.

From the point of view of the problems
introduced by the dew drop and the ease of the
10 assembling process, it is desirable to adhere the
vibration and/or shock absorbing members 3, 4 and 5 on
the member confronting the disk unit 1, that is, on a
lid member 2 or, on the inner top surface or the inner
side surface of the disk unit accommodating part
15 provided in the housing.

(16) The present invention is characterized
in that, in any of (1) to (15) above, the electronic
apparatus mounted with the disk unit 1 forms a
portable electronic apparatus.

20 By applying the structure of the present
invention to the portable electronic apparatus, it is
possible to improve the reliability of the portable
electronic apparatus with respect to the shock applied
thereto when the portable electronic apparatus is
25 carried.

(17) The present invention is characterized
in that, in any of (1) to (16) above, the disk unit 1
is a hard disk unit.

In this case, it is possible to improve the
30 reliability of the hard disk unit.

(18) A disk unit mounting mechanism
mountable with a disk unit 1 in the present invention
is characterized by a disk unit accommodating part
accommodating the disk unit 1 which is mounted, a lid
35 member 2 covering the disk unit accommodating part,
and a vibration and/or shock absorbing member 3 which
absorbs vibration and/or shock and is arranged between

1 the lid member 2 and the disk unit 1 which is mounted.

By providing the vibration and/or shock absorbing members 3 between the disk unit 1 which is mounted and the lid member 2 which covers the disk unit accommodating part provided in the housing, it is possible to improve the shock-resistance of the disk unit. Hence, it is possible to prevent data destruction from being generated in the disk unit 1, such as the HDD, due to the shock when the disk unit is dropped or is placed on a desk.

(19) A disk unit mounting mechanism mountable with a disk unit 1 in the present invention is characterized by a disk unit accommodating part accommodating the disk unit 1 which is mounted, a lid member 2 covering the disk unit accommodating part, and a vibration and/or shock absorbing member 3, formed by a plurality of small pieces and absorbs vibration and/or shock, arranged between the lid member and the disk unit which is mounted, and a sheet member 6 arranged between the plurality of small pieces forming the vibration and/or shock absorbing member 3 and the disk unit 1 which is mounted.

As described above under (3) above, by mounting the vibration and/or shock absorbing members 3 on the sheet material 6, it is possible to prevent the deformation of the vibration and/or shock absorbing members 3. As a result, the shock resistance of the disk unit is improved, and in addition, it is possible to prevent the electrical short-circuit even when the dew drop is formed on the vibration and/or shock absorbing members 3.

(20) A disk unit mounting mechanism mountable with a disk unit 1 in the present invention is characterized by a disk unit accommodating part accommodating the disk unit 1 which is mounted, and vibration and/or shock absorbing members 3 and 4 arranged between an inner bottom surface and an inner

1 side surface of the disk unit accommodating part and
the disk unit 1 which is mounted, wherein the
vibration and/or shock absorbing member 3 arranged
between the disk unit 1 which is mounted and the inner
5 bottom surface and the vibration and/or shock
absorbing member 4 arranged between the disk unit 1
which is mounted and the inner side surface are made
of mutually different materials.

By providing the vibration and/or shock
10 absorbing members 4 between the disk unit 1 and the
inner surface of the disk unit accommodating part
provided in the housing, it is possible to improve the
vibration resistance of the disk unit 1, thereby
preventing a read error from being generated.

15 Further, in this case, the vibration
resistance is required of the vibration and/or shock
absorbing members 4 provided between the disk unit 1
and the inner surface of the disk unit accommodating
part provided in the housing, while the shock
20 resistance is required of the vibration and/or shock
absorbing members 3 provided between the disk unit 1
and the inner bottom surface of the disk unit
accommodating part. Hence, it is desirable that the
vibration and/or shock absorbing members 3 and 4 are
25 made of mutually different materials.

(21) A disk unit mounting mechanism
mountable with a disk unit 1 in the present invention
is characterized by a disk unit accommodating part
accommodating the disk unit 1 which is mounted, and
30 vibration and/or shock absorbing members 3, 4 and 5
arranged between an inner bottom surface and an inner
side surface of the disk unit accommodating part and
the disk unit 1 which is mounted, wherein the
vibration and/or shock absorbing members 3 and 5
35 arranged between the disk unit 1 and the inner bottom
surface and the vibration and/or shock absorbing
member 4 arranged between the disk unit 1 and the

1 inner side surface are made of materials having
mutually different vibration and/or shock absorbing
characteristics.

By providing vibration and/or shock
5 absorbing members having different vibration and/or
shock absorbing characteristics, it is possible to
effectively cope with shocks ranging from weak to
strong shocks, and the vibration resistance and the
shock resistance of the disk unit are improved.

10 (22) A disk unit mounting mechanism
mountable with a disk unit 1 in the present invention
is characterized by a disk unit accommodating part
accommodating the disk unit 1 which is mounted, and a
plurality of vibration and/or shock absorbing members
15 3, 4 and 5 having different thicknesses arranged with
respect to at least one of confronting surfaces of the
disk unit 1 which is mounted and the disk unit
accommodating part.

By providing the vibration and/or shock
20 absorbing members 3, 4 and 5 having the different
thicknesses with respect to at least one surface of
the disk unit 1, particularly with respect to a lid
member 2, it is possible to use a thin material and a
thick material, for example, so that the shock
25 resistance is improved with respect to various kinds
of shocks ranging from weak to strong shocks.

(23) A disk unit mounting mechanism
mountable with a disk unit 1 in the present invention
is characterized by a disk unit accommodating part
30 accommodating the disk unit 1 which is mounted, and a
plurality of vibration and/or shock absorbing members
3, 4 and 5 having different vibration and/or shock
absorbing characteristics arranged with respect to at
least one of confronting surfaces of the disk unit 1
35 which is mounted and the disk unit accommodating part.

By providing the vibration and/or shock
absorbing members 3, 4 and 5 with respect to at least

1 one surface of the disk unit 1, particularly, with
respect to the side of a lid member 2, and forming the
vibration and/or shock absorbing members 3, 4 and 5
from materials having different vibration and/or shock
5 absorbing characteristics, it is possible to realize a
shock resistance which can cope with a wide range of
shocks ranging from weak to strong shocks.

Next, a description will be given of a first
embodiment of the present invention, by referring to
10 FIGS.3 through 6.

In order to simplify the description, the
illustration and description of mounting structures of
small parts which are not directly related to the
subject matter of the present invention are omitted.

15 FIG.3A is a perspective view showing a
display panel part 10 of a notebook type personal
computer. Mounting metal fittings 11_1 and 11_2
provided on both sides at a lower end of the display
panel part 10 are positioned with respect to recesses
20 of a plastic housing base 30 shown in FIG.5, and are
fixed to the housing base 30 by screws 31 and 32.

FIG.3B is a perspective view showing a
housing top cover 20 made of a plastic. The housing
top cover 20 is positioned with respect to the housing
25 base 30 shown in FIG.5, and is fixed to the housing
base 30 by screws 21, 32 and 33.

The screws 32 fix the housing top cover 20
on the housing base 30 via the mounting metal fittings
 11_1 and 11_2 .

30 FIG.4 is a bottom view showing a back side
of the housing top cover 20 shown in FIG.3B. 2 small
pieces of vibration and/or shock absorbing members
 23_1 , 23_2 and 23_3 are adhered on a part of the housing
top cover making contact with a HDD 34, that is, on an
35 inner top surface 22 of a HDD accommodating part 35.

For example, the vibration and/or shock
absorbing members 23_1 , 23_2 and 23_3 have a thickness of

1 2 mm and are made of a soft ether system polyurethane (Sorbothane (trademark)).

FIG.5 is a disassembled perspective view of the housing base 30 showing a mounting structure of the HDD 34. After accommodating the HDD 34 in the HDD accommodating part 35, a plastic lid member 40 is mounted at an opening of the HDD accommodating part 35 by sliding the lid member 40, and the lid member 40 is fixed on the housing base 30 by screws 44. The lid member 40 is provided with a sheet material 41 which is made of a polyester film. 3 small pieces of vibration and/or shock absorbing members 42_1 , 42_2 and 42_3 are adhered along one of the 2 longer sides of the sheet material 41, and 3 small pieces of vibration and/or shock absorbing members 43_1 , 43_2 and 43_3 are adhered along the other of the 2 longer sides of the sheet material 41.

In FIG.5, a connector with respect to a FPC cable 36 is indicated by broken lines on the left of the HDD 34.

Similarly to the vibration and/or shock absorbing members 23_1 , 23_2 and 23_3 , the vibration and/or shock absorbing members 42_1 , 42_2 , 42_3 , 43_1 , 43_2 and 43_3 have a thickness of 2 mm and are made of a soft ether system polyurethane (Sorbothane (trademark)).

When the 6 vibration and/or shock absorbing members 42_1 , 42_2 , 42_3 , 43_1 , 43_2 and 43_3 made of the ether system polyurethane are provided, it was confirmed as a result of experiments conducted with regard to the shock resistance that, with respect to a shock which causes a maximum acceleration speed of 185.25 G in the case of the conventional HDD fixed by the screws, the maximum acceleration speed becomes 117.00 G in the case of the HDD 34 mounted with the mounting structure of this embodiment. Hence, the shock resistance of the HDD in this embodiment was

1 greatly improved compared to the conventional HDD
fixed by the screws.

The vibration and/or shock absorbing members
23₁, 23₂ and 23₃ provided on the inner top surface of
5 the HDD accommodating part 35 are arranged so as not
to overlap the FPC cable 36 in a projection. Hence,
the HDD 34 makes direct contact with the vibration
and/or shock absorbing members 23₁, 23₂ and 23₃, and
the HDD 34 is protected from the vibration and/or
10 shock by the vibration and/or shock absorbing members
23₁, 23₂, 23₃, 42₁, 42₂, 42₃, 43₁, 43₂ and 43₃
provided above and below the HDD 34.

In addition, the sheet material 41 is
provided so that the HDD 34 will not make direct
15 contact with the vibration and/or shock absorbing
members 42₁, 42₂, 42₃, 43₁, 43₂ and 43₃ which have a
large coefficient of friction, when sliding the lid
member 40 and mounting the lid member 40 at the
opening of the HDD accommodating part 35. Thus, by
20 using this sheet material 41, the vibration and/or
shock absorbing members 42₁, 42₂, 42₃, 43₁, 43₂ and
43₃ will not be deformed in the horizontal direction
due to the friction when the lid member 40 is slid,
thereby making it possible to obtain the designed
25 vibration resistance and shock resistance. Further,
moisture absorbed by the vibration and/or shock
absorbing members 42₁, 42₂, 42₃, 43₁, 43₂ and 43₃ will
not cause an electrical short-circuit even if the
vibration and/or shock absorbing members 42₁, 42₂,
30 42₃, 43₁, 43₂ and 43₃ are provided on a side of the
HDD 34 having exposed wirings and/or electrical
circuits.

FIG.6 is a perspective view of the housing
base 30 showing the arrangement of vibration and/or
35 shock absorbing members 37₁ through 37₈ provided on
the inner side surfaces of the HDD accommodating part
35. In FIG.6, the illustration of the mounting state

1 of some of the small parts shown in FIG.5 is omitted.

As shown in FIG.6, 2 small pieces of the vibration and/or shock absorbing members 37₁ through 36₈ are adhered on each of the 4 inner side surfaces
5 of the HDD accommodating part 35.

In this case, a high vibration resistance is required of the vibration and/or shock absorbing members 37₁ through 37₈, and thus, the vibration and/or shock absorbing members 37₁ through 37₈ must be
10 made of a hard material compared to the vibration and/or shock absorbing member 23₁ or the like. For example, a high-density urethane foam material having a thickness of 3 mm, a density of 0.48 g/cm³, a tensile strength of 18.0 kg/cm², an elongation of
15 140%, a tear strength of 6.3 kg/cm, a compression strength of 2.5 kg/cm² to compress 25%, and a compression residual distortion of 3.9%.

By providing the vibration and/or shock absorbing members 37₁ through 37₈ on the inner side
20 surfaces of the HDD accommodating part 35, the vibration resistance of the HDD 34 is improved. In addition, it is possible to prevent a read error from being generated due to residual vibration accompanying the rotation of the disk-shaped storage media when
25 making a seek operation in the HDD 34.

As described above, in the first embodiment of the present invention, the small pieces of vibration and/or shock absorbing members 23₁ through 23₃, 42₁ through 43₃ and 37₁ through 37₈ are provided
30 on the inner top and bottom surfaces and the 4 inner side surfaces, that is, a total of six surfaces, of the HDD accommodating part 35 making contact with the HDD 34. For this reason, it is possible to effectively protect the HDD 34 from the shock which is
35 applied on the HDD when the notebook type personal computer is dropped or when the notebook type personal computer is placed on the desk, for example. As a

1 result, the disk-shaped storage media is undamaged,
and the reliability of the HDD 34 is improved because
the fault caused by data destruction is prevented.

The reason why the vibration and/or shock
5 absorbing member is divided into small pieces is
because, as a result of various kinds of experiments
which were conducted, it was found that the vibration
resistance and the shock resistance are improved when
small pieces of the vibration and/or shock absorbing
10 members are used as compared to the case where a
single large vibration and/or shock absorbing member
is used.

In addition, since the sheet material 41 is
used in this first embodiment, a short-circuit will
15 not be generated by the vibration and/or shock
absorbing members 42₁ through 43₃ which confront the
printed circuit of the HDD 34, even when the dew drop
is formed on the vibration and/or shock absorbing
members 42₁ through 43₃. Hence, the reliability of
20 the HDD 34 is improved.

In the first embodiment described above, a
polyester film is used as the sheet material 41.
However, the material used for the sheet material 41
is not limited to polyester, and any insulator
25 material having a small coefficient of friction, such
as a teflon resin sheet material, may be used as the
sheet material 41.

Next, a description will be given of a
second embodiment of the present invention, by
30 referring to FIGS. 7A through 7C. In this second
embodiment, the structure of the vibration and/or
shock absorbing material provided on the lid member 40
is different from that of the first embodiment, but
the second embodiment is otherwise the same as the
35 first embodiment. FIG. 7A is a perspective view
showing an important part of the second embodiment,
FIG. 7B is a side view viewed in a direction A in FIG.

1 7A, and FIG.7C is a side view viewed in a direction B
in FIG.7A.

In this second embodiment, on a side of the
sheet material 41 confronting the lid member 40, 3
5 small pieces of vibration and/or shock absorbing
members 411 are adhered along one of the 2 longer
sides of the sheet material 41, and 3 small pieces of
vibration and/or shock absorbing members 412 are
adhered along the other of the 2 longer sides of the
10 sheet material 41, similarly to the first embodiment.
The sheet material 41 is made of a polyester film, and
the vibration and/or shock absorbing members 411 have
a thickness of 2 mm and are made of a soft ether
system polyurethane. In addition, vibration and/or
15 shock absorbing members 412 having a thickness of 1.5
mm and made of an ether system polyurethane
(Sorbothane, trademark) which is harder than the
vibration and/or shock absorbing members 411 are
additionally provided between each of the vibration
20 and/or shock absorbing members 411.

It is desirable that the thickness of the
vibration and/or shock absorbing members 412 which are
additionally provided is set approximately equal to a
thickness at which the compressed vibration and/or
25 shock absorbing members 411 lose the buffering effect.
If the case of a weak shock, the shock is softly
absorbed solely by the soft vibration and/or shock
absorbing members 411. On the other hand, in the case
of a strong shock, the shock is absorbed in 2 stages,
30 that is, the soft vibration and/or shock absorbing
members 411, and the hard vibration and/or shock
absorbing members 412 which are additionally provided
to absorb the shock which cannot be fully absorbed by
the soft vibration and/or shock absorbing members 411.
35 Therefore, as compared to the first embodiment, this
second embodiment can more effectively cope with
various kinds of shocks ranging from weak to strong

1 shocks.

Next, a description will be given of a first modification of the second embodiment, by referring to FIGS.8A through 8C. FIG.8A is a perspective view
5 showing an important part of the first modification of the second embodiment, FIG.8B is a side view viewed in a direction A in FIG.8A, and FIG.8C is a side view viewed in a direction B in FIG.8A.

In this second embodiment, the 2-stage
10 structure, made up of the soft vibration and/or shock absorbing members 411 and the hard vibration and/or shock absorbing members 412, is provided with respect to the lid member 40. However, the vibration and/or shock absorbing members 412 which are additionally
15 provided are not limited to the material which is harder than the soft vibration and/or shock absorbing members 411. It is possible to realize the 2-stage structure by use of the same material (or the same hardness) but by varying the thicknesses of vibration
20 and/or shock absorbing members 421 and vibration and/or shock absorbing members 422 which are additionally provided, as shown in FIGS.8A through 8C. Alternatively, it is possible to realize the 2-state structure by using materials having mutually different
25 vibration and/or shock absorbing characteristics for the vibration and/or shock absorbing members 421 and the vibration and/or shock absorbing members 422 which are additionally provided.

Next, a description will be given of a
30 second modification of the second embodiment, by referring to FIG.9. FIG.9 is a perspective view showing an important part of the second modification of the second embodiment.

In this second modification of the second
35 embodiment, relative hardnesses of vibration and/or shock absorbing members 431 and 432 shown in FIG.8 are different. For example, the relative hardness of the

1 vibration and/or shock absorbing members 431 is
greater than that of the vibration and/or shock
absorbing members 432, or vice versa.

Furthermore, the vibration and/or shock
5 absorbing members 23₁ through 23₃ provided on the
inner top surface 22 of the HDD accommodating part 35
may also have the 2-stage structure described above.
Moreover, the vibration and/or shock absorbing members
37₁ through 37₈ provided on the inner side surfaces of
10 the HDD accommodating part 35 may also have the 2-
stage structure described above. By using the 2-stage
structure, the number of parts increases, but the
vibration resistance and the shock resistance are
further improved.

15 Next, a description will be given of a third
embodiment of the present invention, by referring to
FIG.10.

In this third embodiment, the structure of
the vibration and/or shock absorbing material provided
20 on the lid member 40 is different from that of the
first embodiment, but this third embodiment is
otherwise the same as the first embodiment.
Accordingly, a description will only be given with
respect to the structure of the lid member 40.

25 In this third embodiment, a pair of
elongated vibration and/or shock absorbing members 45₁
and 45₂ having a thickness of 2 mm and made of a soft
ether system polyurethane (Sorbothane, trademark) is
adhered directly on the plastic lid member 40 on the
30 surface of the lid member 40 confronting the HDD 34,
along the 2 longer sides of the lid member 40.

It was confirmed as a result of experiments
conducted with regard to the shock resistance that,
with respect to a shock which causes a maximum
35 acceleration speed of 185.25 G in the case of the
conventional HDD fixed by the screws, the maximum
acceleration speed becomes 139.19 G in the case of the

1 HDD 34 mounted with the mounting structure of this
embodiment. Hence, the shock resistance of the HDD in
this embodiment was improved compared to the
conventional HDD fixed by the screws.

5 The shock resistance obtained in this third
embodiment is not as high as that obtained in the
first embodiment. However, this third embodiment has
an advantage over the first embodiment in that the
number of vibration and/or shock absorbing members is
10 small, and the operation of adhering the vibration
and/or shock absorbing members can be simplified due
to the small number of vibration and/or shock
absorbing members.

In this third embodiment, the vibration
15 and/or shock absorbing members 45₁ and 45₂ are adhered
directly on the lid member 40. However, it is of
course possible to adhere the vibration and/or shock
absorbing members 45₁ and 45₂ via a polyethylene sheet
material, similarly to the first embodiment described
20 above.

Although the present invention is applied to
the HDD in the embodiments described above, the
application of the present invention is of course not
limited to the HDD. The present invention is
25 similarly applicable to various kinds of disk units,
including floppy disk drives, compact disk units, DVD
(digital video disk) units, MD (magnetic disk) units,
and MO (magneto-optic) disk units.

For example, the soft vibration and/or shock
30 absorbing members provided above and below the HDD
accommodating part are not limited to the soft ether
system polyurethane, and appropriate modifications may
be made depending on the design specifications of the
computer. In addition, the thickness of the vibration
35 and/or shock absorbing members is of course not
limited to 2 mm, and the thickness may be varied
arbitrarily depending on the characteristic of the

1 vibration and/or shock absorbing material used.

If the vibration and/or shock absorbing members are too soft or too thin, the shock resistance deteriorates. Hence, it is necessary to select the
5 material and thickness of the vibration and/or shock absorbing members within a range such that the space occupied by the vibration and/or shock absorbing members within the HDD accommodating part will not increase considerably, so as to satisfy the design
10 specifications, that is, guarantee a shock resistance of 300 G when the HDD is not in use, for example.

On the other hand, the vibration and/or shock absorbing members provided on the inner side surfaces of the HDD accommodating part are not limited
15 to the high-density urethane foam having the characteristic of the above described embodiment. The thickness of these vibration and/or shock absorbing members is likewise not limited to 3 mm, and appropriate modifications may be made depending on the
20 design specifications.

In addition, the present invention is applied to the notebook type personal computer in the embodiments described above. However, the application of the present invention is not limited to the
25 notebook type personal computer, and the present invention is applicable to any portable electronic apparatus in general which is mounted with a disk unit such as a HDD, such as a notebook type word processor and a pen input type personal computer.

30 Therefore, according to the present invention, it is possible to improve the vibration resistance and the shock resistance because the disk unit such as the HDD is protected by small pieces of the vibration and/or shock absorbing members. As a
35 result, it is possible to prevent data destruction from being generated in the disk unit due to the shock and to prevent a read error from being generated in

1 the HDD due to the vibration. Accordingly, the
reliability of the portable electronic apparatus such
as the notebook type personal computer is greatly
improved.

5 Moreover, the present invention is
applicable to any kind of electronic apparatus mounted
with or is designed to be mounted with a disk unit.
Hence, the present invention is similarly applicable
to a docking station or an extended peripheral unit
10 which is connected to a portable information
processing apparatus such as a notebook type computer,
and is mounted with or is designed to be mounted with
a disk unit.

Further, the present invention is not
15 limited to these embodiments, but various variations
and modifications may be made without departing from
the scope of the present invention.

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1 WHAT IS CLAIMED IS

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1. An electronic apparatus mounted with a disk unit, comprising:

10 a vibration and/or shock absorbing member which absorbs vibration and/or shock provided between the disk unit and a lid member which covers a disk unit accommodating part provided in a housing of the electronic apparatus.

15

2. The electronic apparatus as claimed in claim 1, wherein the vibration and/or shock absorbing member provided between the lid member and the disk unit is formed by a plurality of small pieces.

25

3. The electronic apparatus as claimed in claim 2, wherein a sheet member is provided between the disk unit and the plurality of small pieces forming the vibration and/or shock absorbing member.

30

4. An electronic apparatus mounted with a disk unit, comprising:

35 a vibration and/or shock absorbing member, formed by a plurality of small pieces and absorbing vibration and/or shock, provided between the disk unit and a lid

1 member which covers a disk unit accommodating part
provided in a housing of the electronic apparatus; and
a sheet member provided between the disk unit and
the plurality of small pieces forming the vibration
5 and/or shock absorbing member.

10 5. An electronic apparatus mounted with a
disk unit, comprising:
vibration and/or shock absorbing members provided
between the disk unit and an inner bottom surface and
an inner side surface of a disk unit accommodating
15 part provided in a housing of the electronic
apparatus, and the vibration and/or shock absorbing
member provided between the disk unit and the inner
bottom surface and the vibration and/or shock
absorbing member provided between the disk unit and
20 the inner side surface are made of mutually different
materials.

25 6. An electronic apparatus mounted with a
disk unit, comprising:
vibration and/or shock absorbing members provided
between the disk unit and an inner bottom surface and
30 an inner side surface of a disk unit accommodating
part provided in a housing of the electronic
apparatus,
wherein the vibration and/or shock absorbing
member provided between the disk unit and the inner
35 bottom surface and the vibration and/or shock
absorbing member provided between the disk unit and
the inner side surface are made of materials having

1 mutually different vibration and/or shock absorbing
characteristics.

5

7. The electronic apparatus as claimed in
claim 5 or 6, wherein the vibration and/or shock
absorbing member provided between the disk unit and
10 the inner side surface is made of a material having a
higher vibration resistance than a material forming
the vibration and/or shock absorbing member provided
between the disk unit and the inner bottom surface.

15

8. The electronic apparatus as claimed in
claim 5 or 6, wherein the vibration and/or shock
20 absorbing member provided between the disk unit and
the inner side surface is made of a material which is
harder than a material forming the vibration and/or
shock absorbing member provided between the disk unit
and the inner bottom surface.

25

9. The electronic apparatus as claimed in
30 any of claims 5 or 6, wherein the vibration and/or
shock absorbing member provided between the disk unit
and the inner side surface of the disk unit
accommodating part provided in the housing is formed
by a plurality of small pieces.

35

1 10. An electronic apparatus mounted with a
disk unit, comprising:

 a plurality of vibration and/or shock absorbing
members, having different thicknesses, provided with
5 respect to at least one of confronting surfaces of the
disk unit and a disk unit accommodating part provided
in a housing of the electronic apparatus.

10

 11. The electronic apparatus as claimed in
claim 10, wherein the plurality of vibration and/or
shock absorbing members are made of the same material.

15

 12. An electronic apparatus mounted with a
20 disk unit, comprising:

 a plurality of vibration and/or shock absorbing
members, having different vibration and/or shock
absorbing characteristics, provided with respect to at
least one of confronting surfaces of the disk unit and
25 a disk unit accommodating part provided in a housing
of the electronic apparatus.

30

 13. The electronic apparatus as claimed in
claim 10 or 12, wherein the plurality of vibration
and/or shock absorbing members are made of materials
having different hardnesses.

35

1 14. The electronic apparatus as claimed in
any of claims 1, 4, 5, 6, 10 and 12, wherein the
vibration and/or shock absorbing member is also
provided between the disk unit and an inner top
5 surface of the disk unit accommodating part provided
in the housing.

10

15 15. The electronic apparatus as claimed in
any of claims 1, 4, 5, 6, 10 and 12, wherein the
vibration and/or shock absorbing member is adhered on
a member confronting the disk unit.

15

20 16. The electronic apparatus as claimed in
any of claims 1, 4, 5, 6, 10 and 12, wherein the
electronic apparatus mounted with the disk unit forms
a portable electronic apparatus.

25

17. The electronic apparatus as claimed in
any of claims 1, 4, 5, 6, 10 and 12, wherein the disk
unit is a hard disk unit.

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18. A disk unit mounting mechanism
35 mountable with a disk unit, comprising:
a disk unit accommodating part accommodating the
disk unit which is mounted;

1 a lid member covering the disk unit accommodating
part; and

 a vibration and/or shock absorbing member which
absorbs vibration and/or shock and is arranged between
5 the lid member and the disk unit which is mounted.

10 19. A disk unit mounting mechanism
mountable with a disk unit, comprising:

 a disk unit accommodating part accommodating the
disk unit which is mounted;

 a lid member covering the disk unit accommodating
15 part; and

 a vibration and/or shock absorbing member, formed
by a plurality of small pieces and absorbs vibration
and/or shock, arranged between the lid member and the
disk unit which is mounted; and a sheet member
20 arranged between the plurality of small pieces forming
the vibration and/or shock absorbing member and the
disk unit which is mounted.

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 20. A disk unit mounting mechanism
mountable with a disk unit, comprising:

 a disk unit accommodating part accommodating the
30 disk unit which is mounted; and

 vibration and/or shock absorbing members arranged
between an inner bottom surface and an inner side
surface of the disk unit accommodating part and the
disk unit which is mounted,

35 wherein the vibration and/or shock absorbing
member arranged between the disk unit which is mounted
and the inner bottom surface and the vibration and/or

- 1 shock absorbing member arranged between the disk unit
which is mounted and the inner side surface are made
of mutually different materials.

5

21. A disk unit mounting mechanism
mountable with a disk unit, comprising:

- 10 a disk unit accommodating part accommodating the
disk unit which is mounted; and
vibration and/or shock absorbing members arranged
between an inner bottom surface and an inner side
surface of the disk unit accommodating part and the
15 disk unit which is mounted,
wherein the vibration and/or shock absorbing
member arranged between the disk unit and the inner
bottom surface and the vibration and/or shock
absorbing member arranged between the disk unit and
20 the inner side surface are made of materials having
mutually different vibration and/or shock absorbing
characteristics.

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22. A disk unit mounting mechanism
mountable with a disk unit, comprising:

- a disk unit accommodating part accommodating the
30 disk unit which is mounted; and
a plurality of vibration and/or shock absorbing
members having different thicknesses arranged with
respect to at least one of confronting surfaces of the
disk unit which is mounted and the disk unit
35 accommodating part.

1 23. A disk unit mounting mechanism
mountable with a disk unit, comprising:
a disk unit accommodating part accommodating the
disk unit which is mounted; and
5 a plurality of vibration and/or shock absorbing
members having different vibration and/or shock
absorbing characteristics arranged with respect to at
least one of confronting surfaces of the disk unit
which is mounted and the disk unit accommodating part.

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1 ABSTRACT OF THE DISCLOSURE

An electronic apparatus is mounted with a
disk unit, and a vibration and/or shock absorbing
member which absorbs vibration and/or shock is
5 provided between the disk unit and a lid member which
covers a disk unit accommodating part provided in a
housing of the electronic apparatus.

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FIG. 1

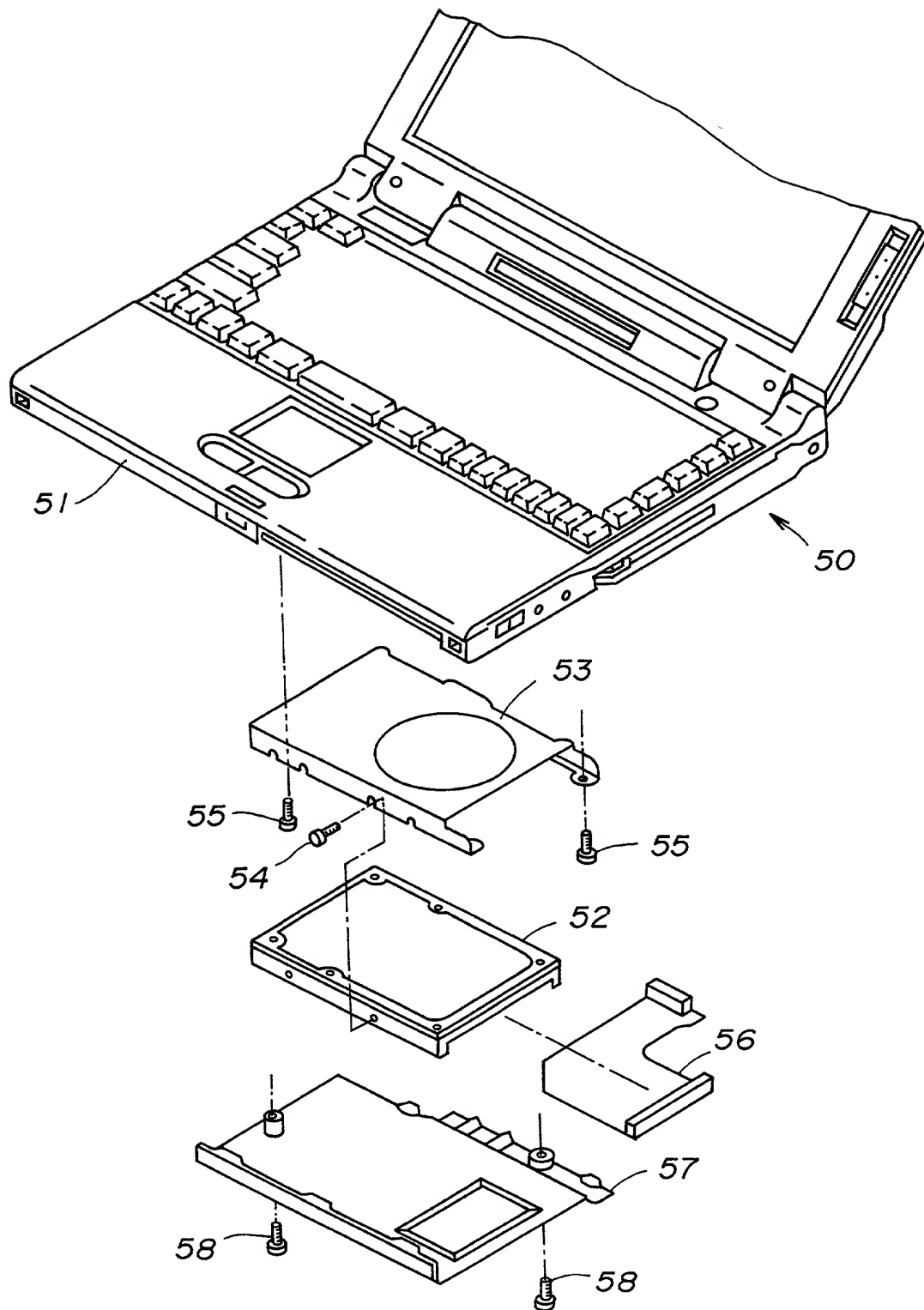


FIG. 2

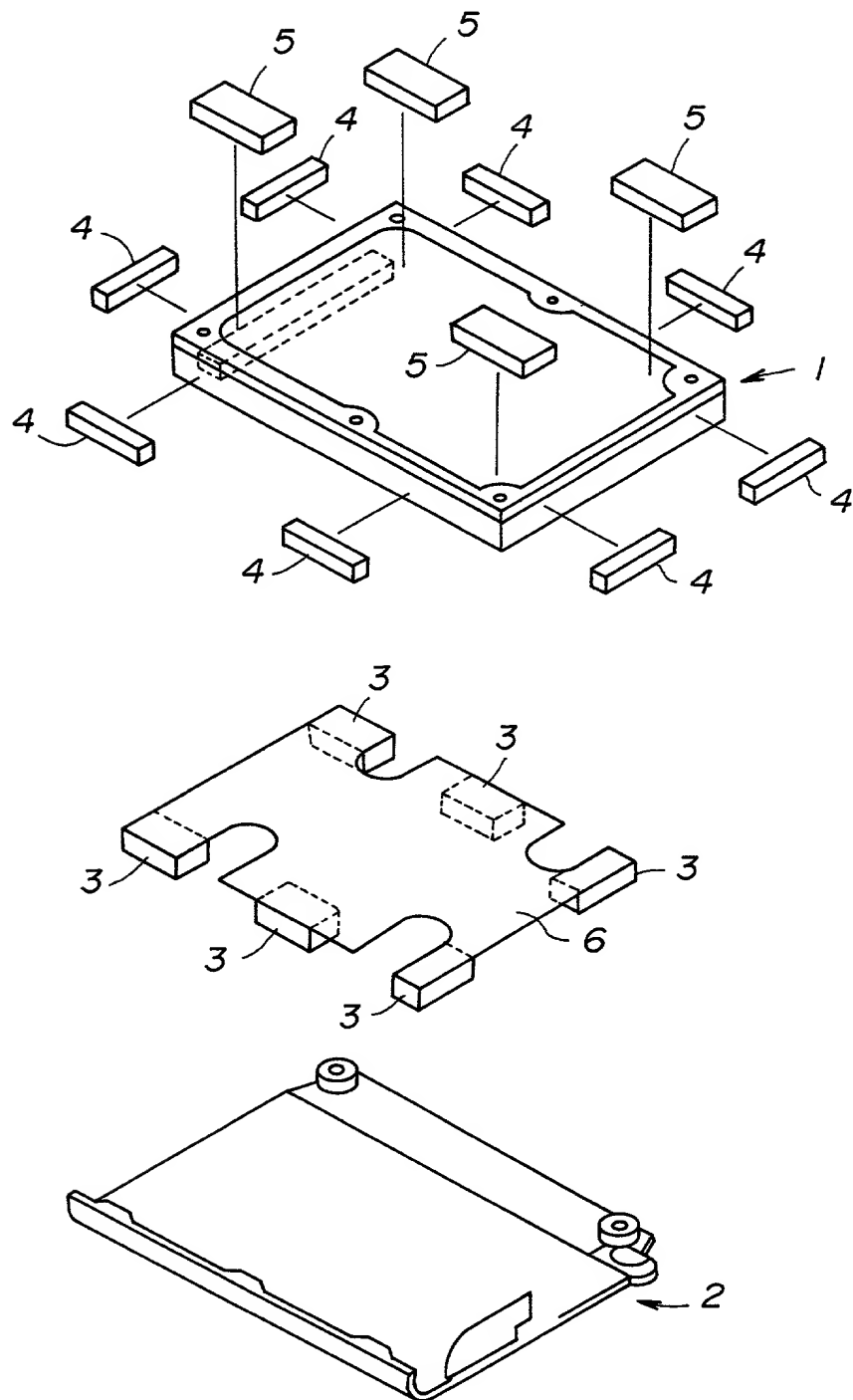


FIG. 3A

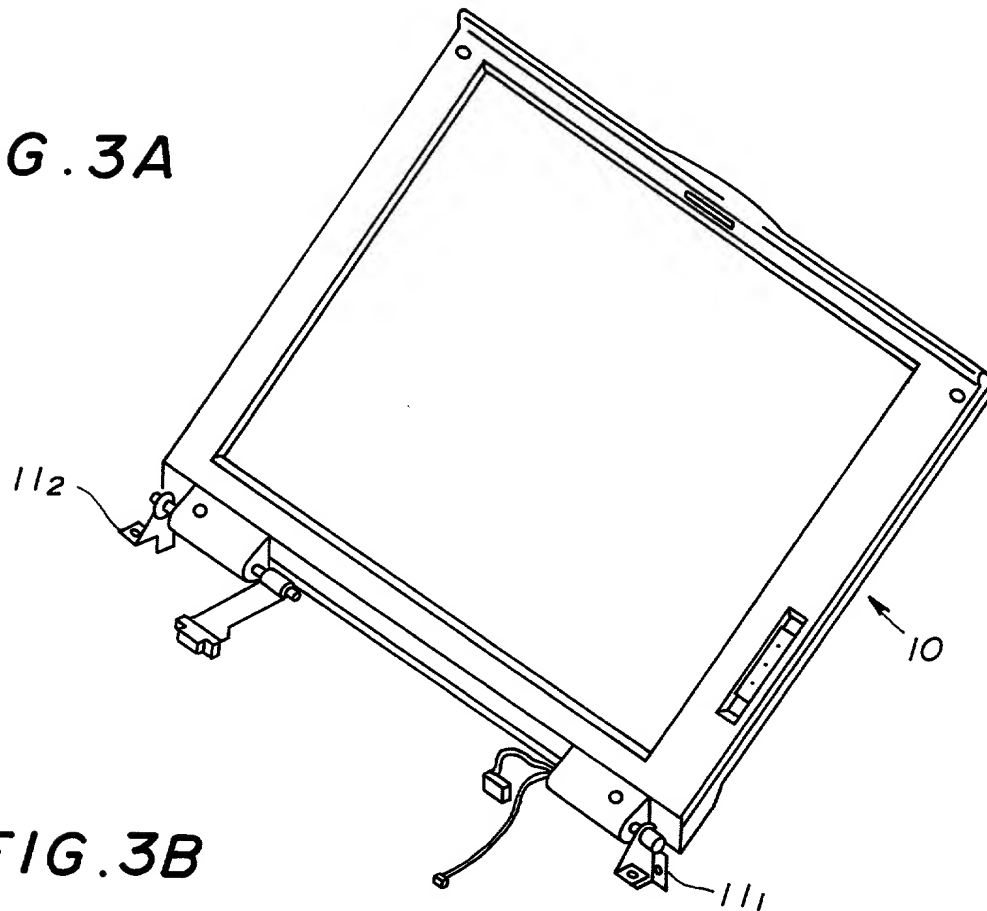


FIG. 3B

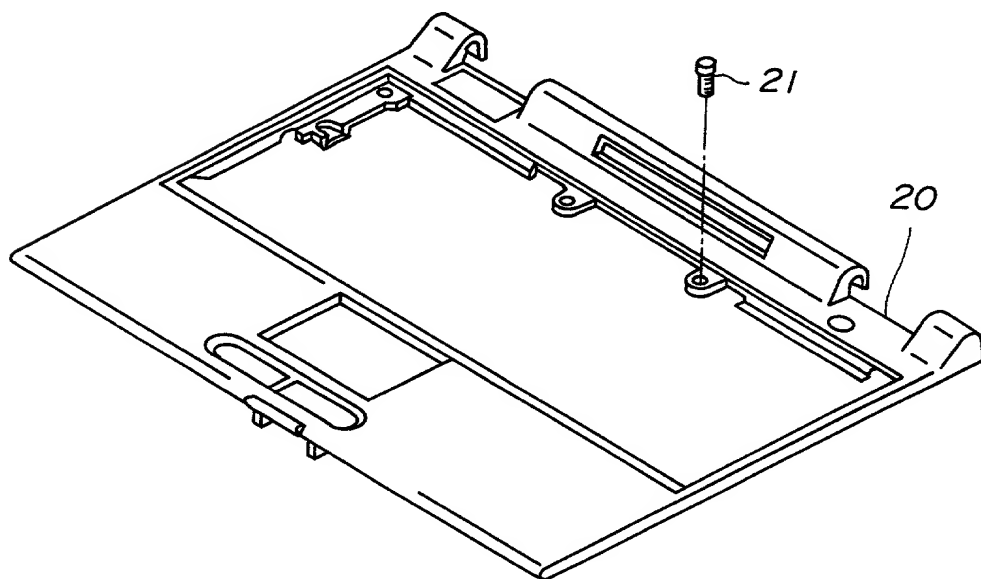


FIG. 4

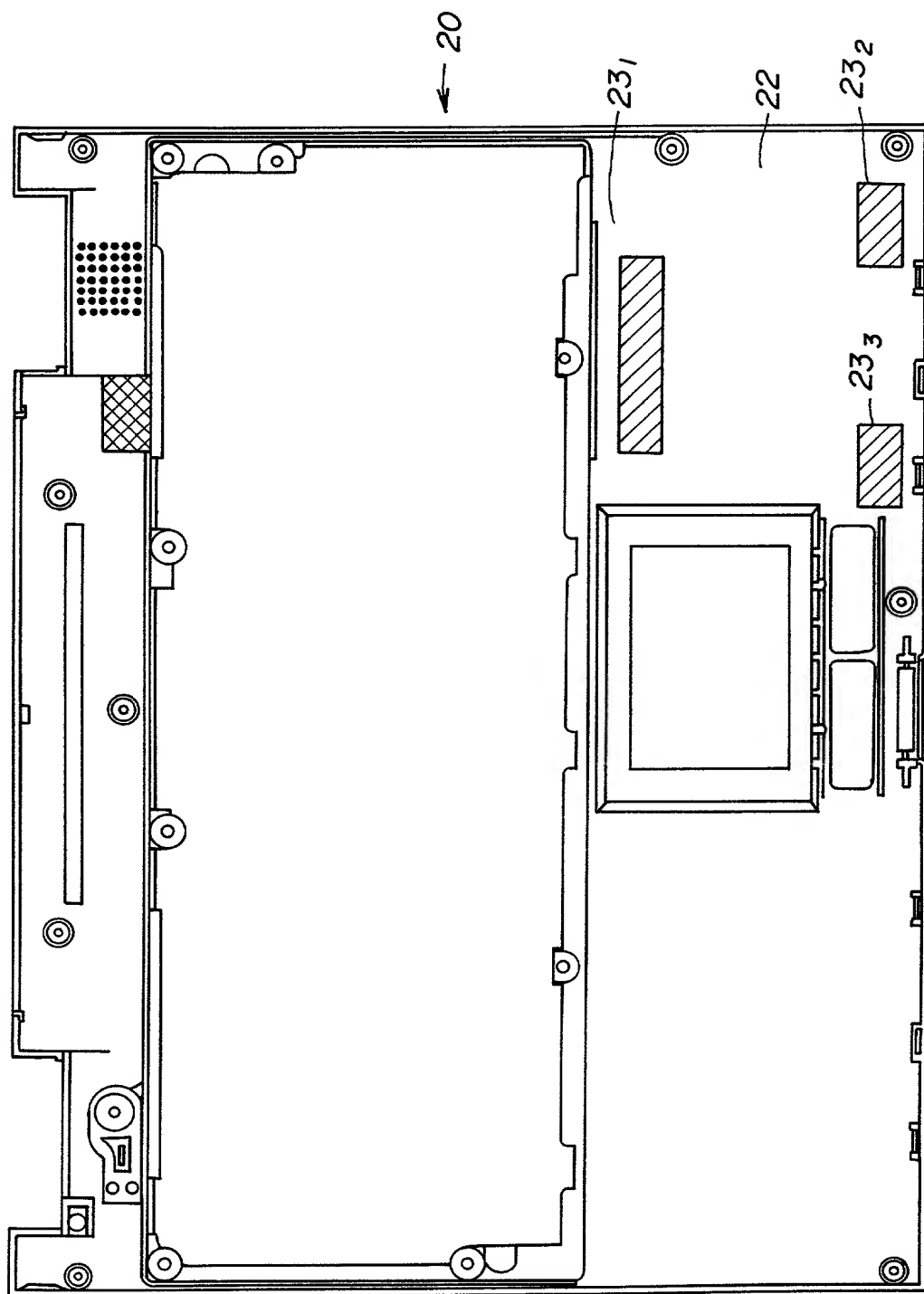


FIG. 5

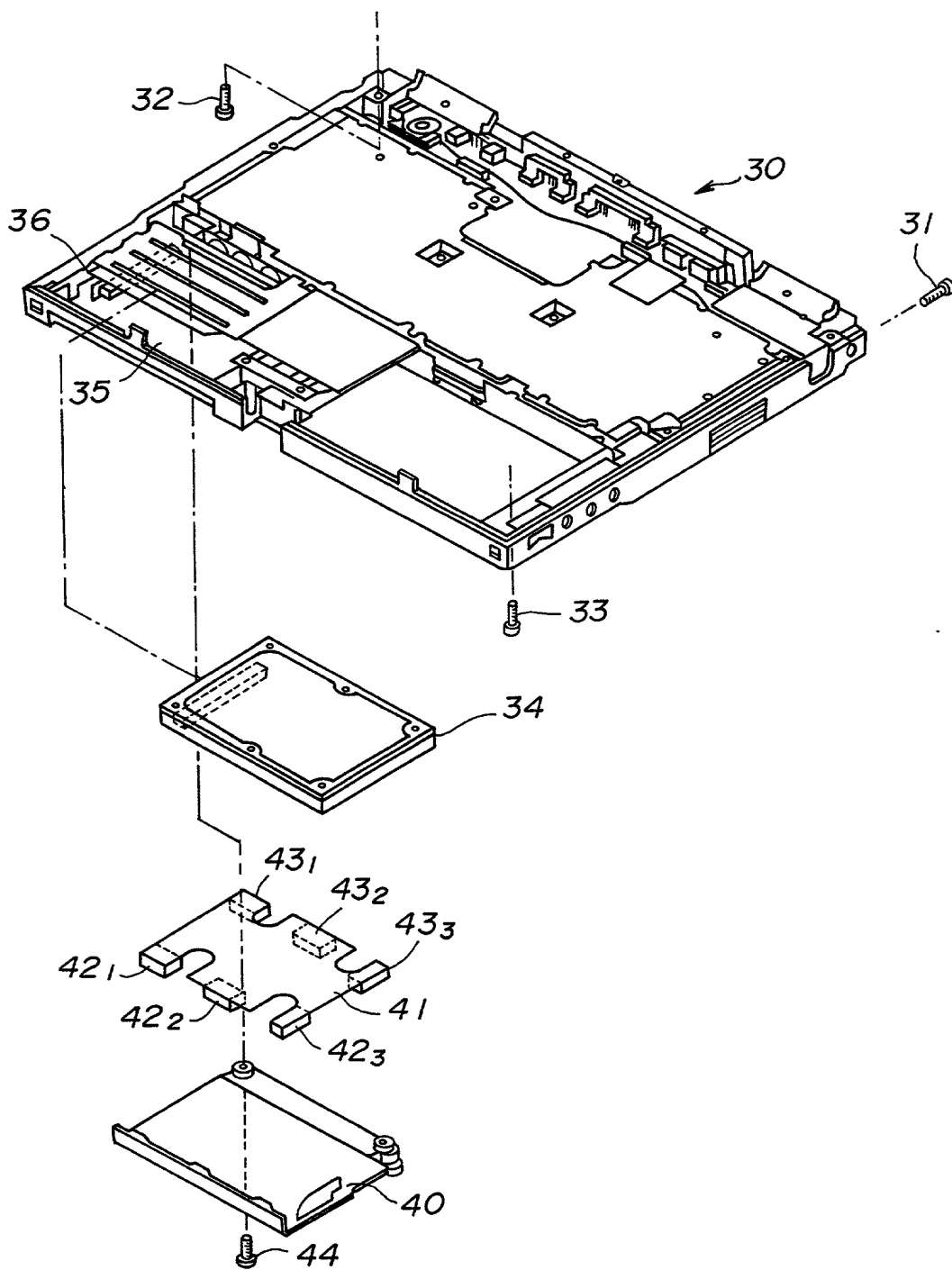


FIG. 6

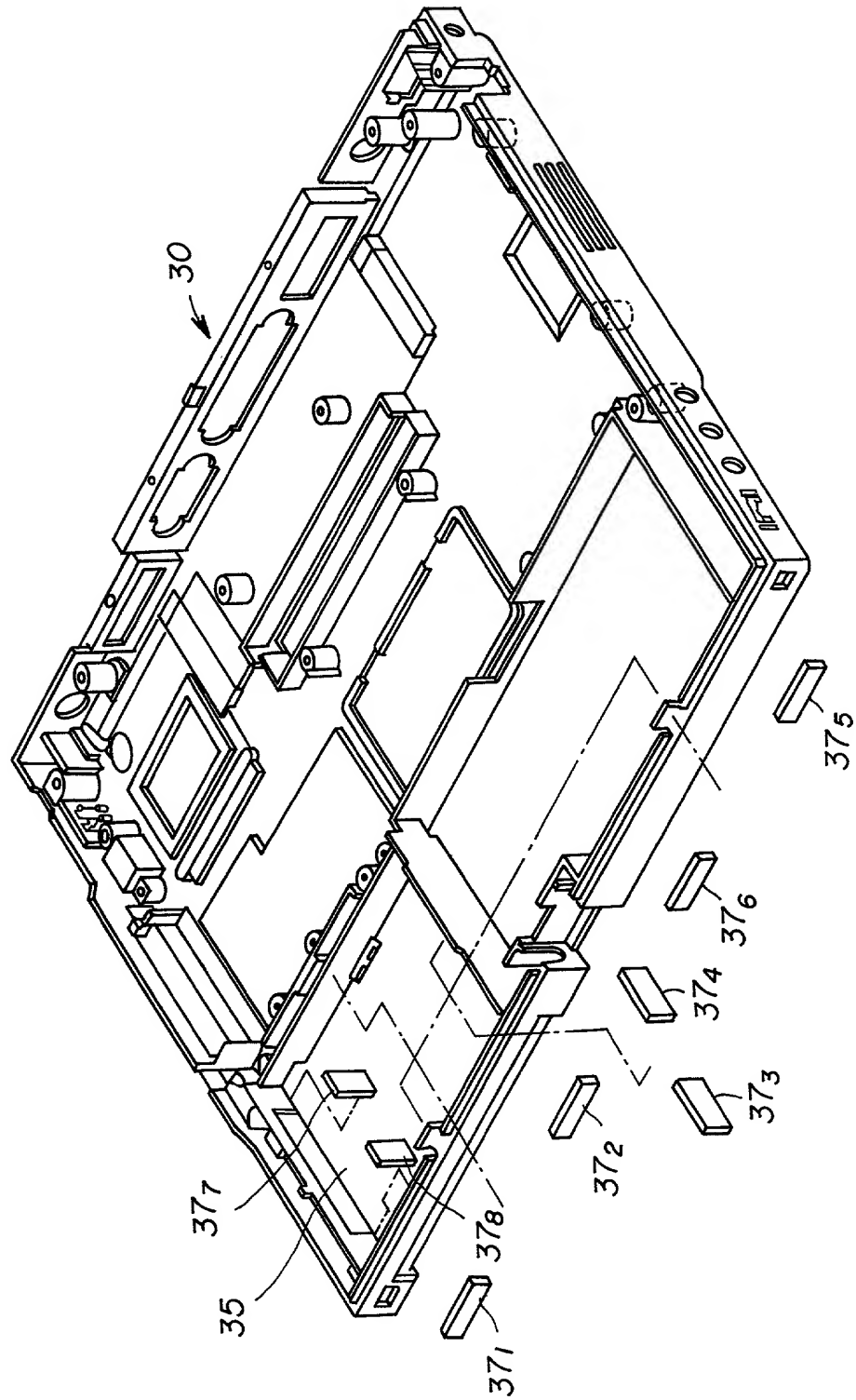


FIG. 7A

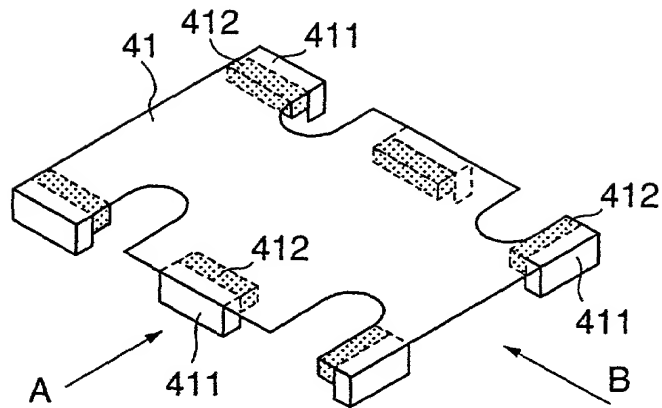


FIG. 7B

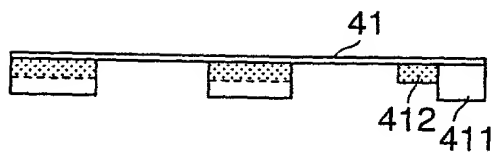


FIG. 7C

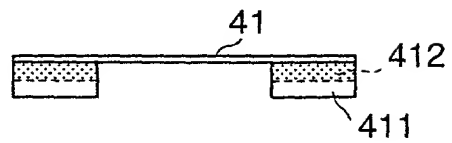


FIG. 8A

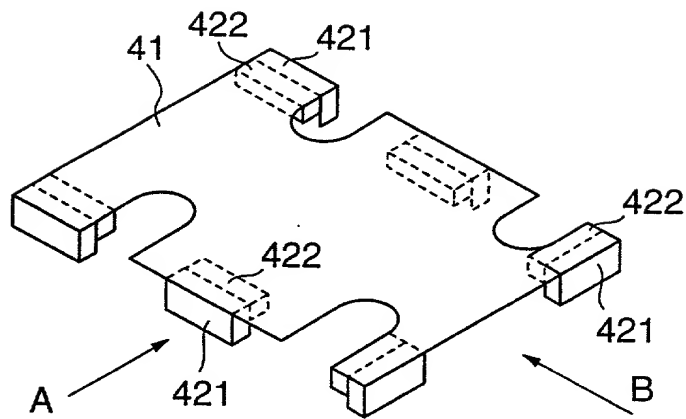


FIG. 8B

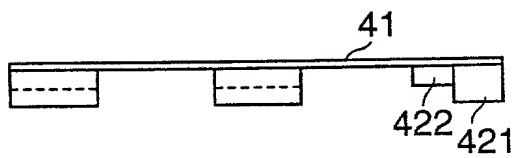


FIG. 8C

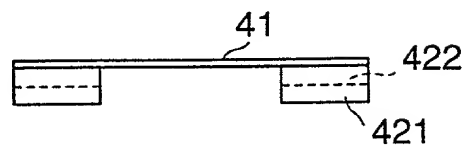


FIG. 9

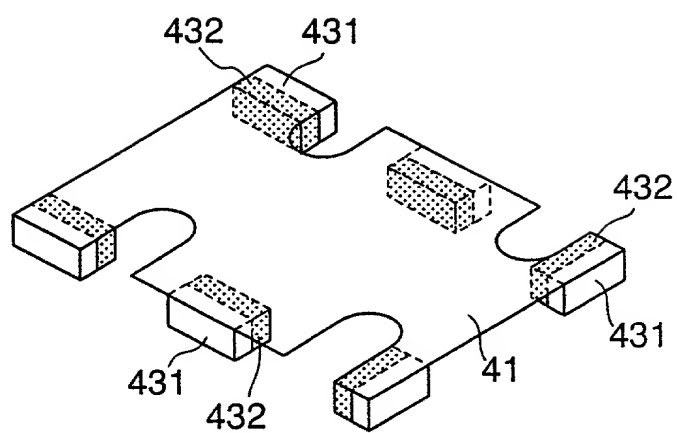


FIG. 10 is a perspective view of the device 10 in a closed position.

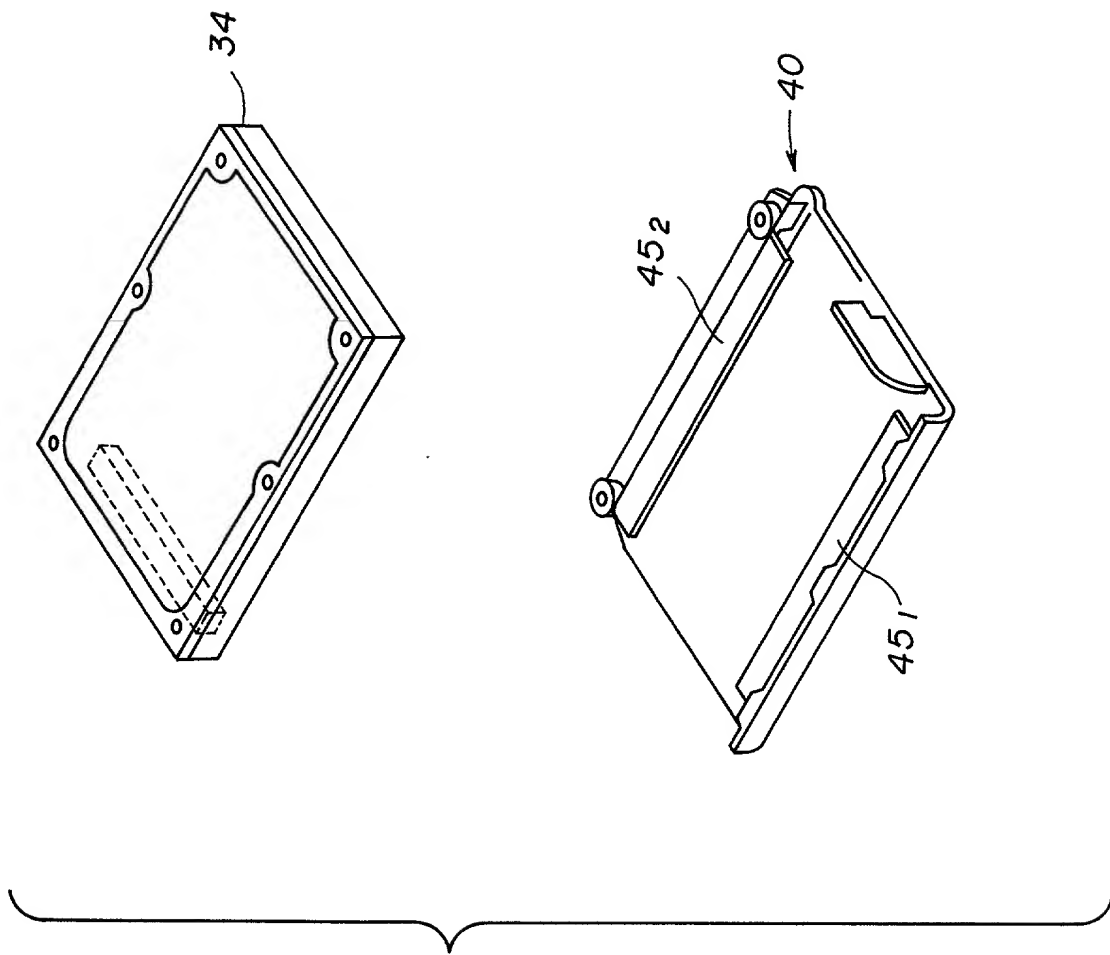


FIG. 10

Declaration and Power of Attorney for U.S. Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ELECTRONIC APPARATUS AND DISK UNIT

MOUNTING MECHANISM

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ 月 日に提出され、米国出願番号または特許協定条約国際出願番号を _____ とし、
（該当する場合） _____ に訂正されました。☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration

(日本語宣言書)

私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基づき下記の、米国外の国の少なくとも一ヶ国を指定している特許協力条約365(a)項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

Prior Foreign Application(s)

| | | |
|---------------------------|-----------|--|
| 外国での先行出願 | | |
| Pat. Appln. No. 9-304640 | Japan | |
| (Number) | (Country) | |
| (番号) | (国名) | |
| Pat. Appln. No. 10-307085 | Japan | |
| (Number) | (Country) | |
| (番号) | (国名) | |

私に、第35編米国法典119条(e)項に基づいて下記の米国外特許出願規定に記載された権利をここに主張いたします。

| | |
|-------------------|---------------|
| (Application No.) | (Filing Date) |
| (出願番号) | (出願日) |

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| | |
|-------------------|---------------|
| (Application No.) | (Filing Date) |
| (出願番号) | (出願日) |

| | |
|-------------------|---------------|
| (Application No.) | (Filing Date) |
| (出願番号) | (出願日) |

私は、私自身の知識に基づいて本宣言書中で私が行なう表明が真実であり、かつ私の入手した情報と私の信じることに基づき表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行えば、出願した、又は発明に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed

優先権主張なし

6/November/1997

(Day/Month/Year Filed)

(出願年月日)

28/October/1998

(Day/Month/Year Filed)

(出願年月日)

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

| | |
|-------------------|---------------|
| (Application No.) | (Filing Date) |
| (出願番号) | (出願日) |

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

| |
|--|
| (Status: Patented, Pending, Abandoned) |
| (現況: 特許許可済、係属中、放棄済) |

| |
|--|
| (Status: Patented, Pending, Abandoned) |
| (現況: 特許許可済、係属中、放棄済) |

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration

(日本語宣言書)

委任状: 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。(弁理士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)
See list of attorneys and/or agents on page 5.

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(Supply similar information and signature for third and subsequent joint inventors.)

| | | |
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| 国籍 | Citizenship | |
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